

NAVY MEDICINE

January-February 1996



**Transfusion
Medicine**

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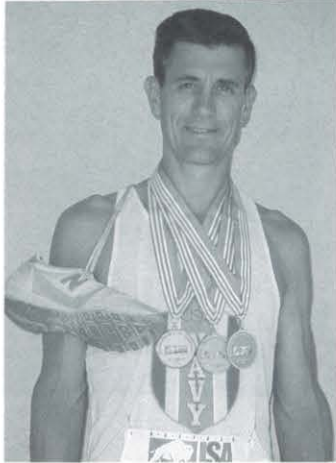
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COVER: Freeze-dried lyophilized human red cells as a powder. For developments in transfusion medicine see page 13. Photo by Richard Bussey, Naval Research Laboratory, Washington, DC.



HMC Yeager

Race Walker Brings Home Three Medals

HMC Warrick M. Yeager of the 3rd Battalion, 7th Marines, stationed in Twentynine Palms, CA, returned from the XI World Veterans Championships last July as a World Champion race walker. Chief Yeager represented Navy medicine and the Navy well by bringing home two gold medals and a silver against extremely stiff international competition.

The biennial event in Buffalo, NY, was the second largest World Veterans Championships ever held, surpassed only by the 1993 games in Miyazaki, Japan. The Buffalo event hosted 5,529 athletes from 74 nations, many of whom were past Olympians; the event was considered to be the "premier international track and field competition for men 40 years of age and over, and women 35 years of age and over," according to the *National Masters News*.

Competing in only his fourth race since taking up the sport, Yeager literally walked away with the silver medal in the 20k road race and led the

American team to the gold in a time of 1:38:19. While the time itself was not particularly impressive, a mere 7:54 per mile pace, what was impressive was his ability to rise to the occasion after having missed the entire racing season because of a deployment to Okinawa with his Marine unit. In fact, Yeager did so well, many of the American walkers thought he was

European, even though he wore the red, white, and blue colors. A week later he became the 5k World Champion, picking up his second gold medal in a time of 22:59:70.

When asked how he is able to balance the requirements of work and training, Yeager replied, "I just view my training as part of my job. Because I represent the Navy 24 hours a day, the image I present is the image others perceive as the Navy being. Even though it requires a little more effort on my part, it is essential that I put forth that effort. I have to set an example for those under my charge to follow. It's pretty hard for my troops to come up with something other than a legitimate medical reason for not meeting and maintaining the physical readiness standards, especially when their supervisor exceeds them."

HMC Yeager is currently preparing to walk a 50k (31-mile) road race in January in an attempt to make the qualifying time necessary for a shot at attending the Olympic Trials scheduled for April. □



At the 2 Sept 1945 ceremonies marking the end of World War II, FADM Nimitz represented the United States.



A Sailor Like Any Other Sailor

Everyone who attended school in the United States knows the importance of Fleet Admiral Chester W. Nimitz to the Pacific Theater's naval warfare during World War II. Some may even know that he was the representative of the United States who signed the Japanese Instrument of Surrender on 2 Sept 1945. Few, however, are aware of the close relationship the admiral enjoyed with (then) Oak Knoll Naval Hospital after the war, when he and his family made Berkeley their permanent home.

In fact, it was at Oak Knoll that FADM Nimitz spent the last month of his life before he went home to die on 20 Feb 1966.

"I spent one full month of nights sitting with him in his room," said CAPT Tom Stoeckel, MSC, USNR, who was a young corpsman "just out of Corps School" at the time. "He'd had a stroke that left him partially paralyzed in his left side, and he was trying to build up that side by squeezing a tennis ball," explained Stoeckel, adding that the admiral was alert and would actually play catch with him when he was awake.

But that is the end of the story. It begins somewhere in the late 1940's, after "the hero of Midway" left his United Nations post as the administrator of a plebiscite designed to settle the differences between India and Pakistan.

Starting with its 17 Jan 1948 issue, *The Oak Leaf*, the command information newspaper of the time, abounds with stories and photographs of FADM Nimitz's attendance to the naval hospital's functions: visiting wards with his wife, Catherine, in 1948; pinning on Purple Heart Medals during the Korean War; visits with foreign dignitaries in 1954; Nimitz Day/horseshoe competition in 1955; intern graduating ceremonies in 1957; celebration of the Navy Nurse Corps Golden Jubilee in 1958; a birthday salute in 1960 . . . and so on until his declining years marked by knee and spine surgeries and a final stroke.

Although most have retired or left the area, it is still possible to find Oak Knoll staff members who remember meeting FADM Nimitz during his visits here as a friend or as a patient. And it is from conversations with these people that a

picture of the "sailor" E.B. Potter described in Nimitz's biography as "the quiet but able man who had commanded military operations in the Pacific Ocean" comes into sharp focus.

"I was completely awed by him," said Hal Seibert, who met Nimitz in the course of his duties as a young corpsman in Oak Knoll's laboratory in the late 1950's, when the admiral came in for "some sort of blood work." But Seibert added that after witnessing the admiral "waiting his turn on the mahogany bench like everyone else," he came to regard him as "a real gentle soul with whom one would like to be around and work for." It seems that Nimitz refused the fuss made over him by Oak Knoll's hierarchy when he came for treatment and insisted on following the laboratory practice of having patients wait for service by sitting and "scooting down" a bench in order of arrival.

"They wanted to close the lab and wait for him specifically because he was a five-star admiral," Seibert explained, "but he would have none of that and wanted to be treated like an ordinary sailor." Seibert

is now deputy to the director of ancillary services.

Stoeckel, who said he was apprehensive at being assigned the job of watching over the ailing admiral, confirmed Seibert's opinion and said that he found "just a nice old gentleman who was no more demanding than would [his] grandfather."

When FADM Nimitz shattered his knee cap in 1963, the inevitable decline of old age took over, and it is during this space of time (1963-1966) that the "venerable old gentleman" made indelible marks upon those he met during his meanderings around the hospital grounds. "What I remember most about him is that he rejected all the trappings attached to his status as a fleet admiral," Stoeckel remarked. "What he liked to do was to put on his blue hospital bathrobe and his slippers and just walk around the compound. People would just run into him at any moment."

Nimitz may have been modest when it came to his own case, but he wouldn't hesitate to use his rank for the benefit of others. Stoeckel knows firsthand and recounts the following anecdote that also took place in the laboratory, in the mid-60's . . . while Nimitz was, in yet another instance, waiting his turn in the lab in the fashion Seibert described above.

"A young lieutenant junior grade pilot came in and went right to the front of the line," Stoeckel said, "and when a corpsman [in attendance] told him to take a number and wait like everybody else, the pilot leaned into the window and said, 'Son, I am a jg and I don't have to take a seat.'" Whereupon Nimitz walked over and tapped the pilot on the shoulder, saying, "Son, I am Fleet Admiral Chester Nimitz, and if I can take a number, you can take a number." Needless to say, the red-faced jg sat on the bench and waited his turn without another word.

During those last 3 years, whenever he needed patient care at Oak Knoll, the admiral continued his anonymous walks on the compound, doing his best to mesh into the landscape of hospital routine.

"Old soldiers never die," said World War II's Supreme Commander for the Allied Force GEN Douglas MacArthur

in his famous historic quote. "They just fade away." According to E.B. Potter, Nimitz wanted to go to West Point when he decided on a military career, but was appointed to the U.S. Naval Academy instead and became a sailor. It is, therefore, fitting to say that, like MacArthur's "old soldiers," the Commander-in-Chief of World War II's Pacific Fleet "never died [but] faded away" into history and the archives of Oak Knoll.

On 4 March 1966, *The Oak Leaf* sounded taps for the command's gallant friend of two decades. The editorial read in part: "All hands who had the privilege of knowing Admiral Nimitz will remember his brilliant military achievement. They will also remember him for his quiet dignity, the twinkle in his blue eyes as he told a joke at a party, his soft-spoken, carefully chosen words directed to young interns when he spoke at their graduation, the pleasure he took in winning a game of horseshoes from the Oak Knoll champion, his generosity in autographing the famous photo of the signing of the Articles of Japanese Surrender for corpsmen who had the opportunity to assist with his care during brief periods of hospitalization."

Author's Note: After the war, FADM Nimitz served 2 years as Chief of Naval Operations (1945-1947). Although he retired from active service on 16 Dec 1947, he was confirmed as a five-star admiral for life in May 1946. In 1949 he was named to the United Nations post from which he resigned irrevocably in

Photos courtesy NMC Oakland



FADM Nimitz and wife, Catherine, visit with a sailor wounded in Korea during a tour of the Oak Knoll wards, 1951 . . .



. . . and, 5 years later, with Hock Hin Wong, a retired Navy steward. Their acquaintance dated back to 1932 when Wong cooked for the admiral, then a captain in command of USS *Augusta* in Shanghai.

1952. During that time he often "commuted" to the Bay Area, where the family maintained a home in North Berkeley. In 1963 he moved to Quarters One on Yerba Buena Island with his wife. He died a five-star admiral and, by choice, was buried at Golden Gate National Cemetery on 24 Feb, his 81st birthday, to be near the men who lost their lives in World War II. His wife survived him until 1978 and continued her association with Oak Knoll that started during World War II, when she was Navy Relief Society's representative, July 1943-September 1945. Those who want to learn more about the historical Nimitz and his family should refer to E.B. Potter, Nimitz, Naval Institute Press, Annapolis, MD, 1976. □

—Story by Andree Marechal-Workman, Public Affairs Office, Naval Medical Center, Oakland, CA.

A Navy Medical Department Overview for the Department of the Navy Quality of Life Master Plan

The Secretary of the Navy, in outlining his priorities for the future, tasked the Assistant Secretary of the Navy Quality of Life Master Plan to be used as guidance in the POM98 planning process. To assist in the development of that plan, the Navy Medical Department provided an overview of Navy medicine's contribution to the quality of life of our sailors and marines. Together with the recently updated *Journey to Excellence*, the Navy Medical Department's Strategic Plan, the following executive summary of that overview illustrates the challenges we face today, and our plans for the future in meeting the health care needs of our beneficiaries in "a system that maximizes readiness."

Navy Medicine Today

The Current Requirement

The Navy Medical Department provides a comprehensive health care benefit to its nearly 2.6 million ben-

eficiaries, including active duty sailors and marines and their families, and survivors and retirees and their families. This entitlement has grown over the years from the initial requirement of providing health care to assure a healthy fighting force to that of providing a comprehensive health benefit as part of an overall employee compensation package. This package is essential to attracting and maintaining necessary people to meet the Department of the Navy's (DON's) all volunteer force and its mission requirements.

The *raison d'être* of the Navy Medical Department is its requirement to ensure the availability of healthy people to meet the DON wartime and day-to-day operational readiness missions. We meet this mandate through delivery of health care services by forward deployed medical forces, including hospital corpsmen, dental technicians, physicians, dentists, nurses, and other health care professionals on board combat ships,

hospitalships, in overseas (OCONUS) medical treatment facilities (MTFs), and dental treatment facilities (DTFs), and with the Fleet Marine Force (FMF). In the continental United States (CONUS), through a direct care system of MTFs, DTFs, and clinics, we provide training and support for forward deployed medical units, additional primary care services, secondary, and tertiary levels of care to active duty DON and other uniformed servicemembers. The CONUS direct care system is the launching pad from which the forward deployed medical forces receive their initial training and to which they return to maintain their clinical expertise. This system also provides a rotation base for relief from operational assignments and duty OCONUS.

While meeting training and rotation base requirements, care delivered in the CONUS direct care system also provides the peacetime part of the health care benefit to active duty

family members, survivors, and retirees and their families. However, not all care for these beneficiaries can be accommodated in the CONUS direct care system. The remainder of this health care benefit is met through the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), the TRICARE Family Member Dental Plan insurance program, and through various managed care contract arrangements with civilian providers. Figure 1 illustrates the dynamics involved in meeting Navy medicine's dual health care mission: the readiness requirement and the benefit of employment requirement.

The top arrow represents Navy medicine's requirement to assure the readiness of the Navy and Marine Corps force. The bottom arrow represents Navy medicine's requirement to provide health care to all eligible beneficiaries as a benefit of employment. The box represents CONUS hospitals, clinics, DTFs, and research and training support facilities. Forward-deployed units include medical assets of the fleet, FMF, OCONUS hospitals, clinics, and DTFs, and remote CONUS duty stations. Together these assets must meet the readiness requirement of our mission. CHAMPUS, TFMDP, and Managed Care represent alternatives to the direct care delivery system. Together with the remainder of space available in the direct care system, these assets must meet the benefit of employment requirement of our mission.

How the Requirement Is Met

Navy medicine employs nearly 55,000 full-time personnel (about 12,106 officers, 30,099 enlisted, and 12,360 civilians) and approximately 13,600 reservists in support of its mission. Routinely about 30 percent of its personnel are assigned to

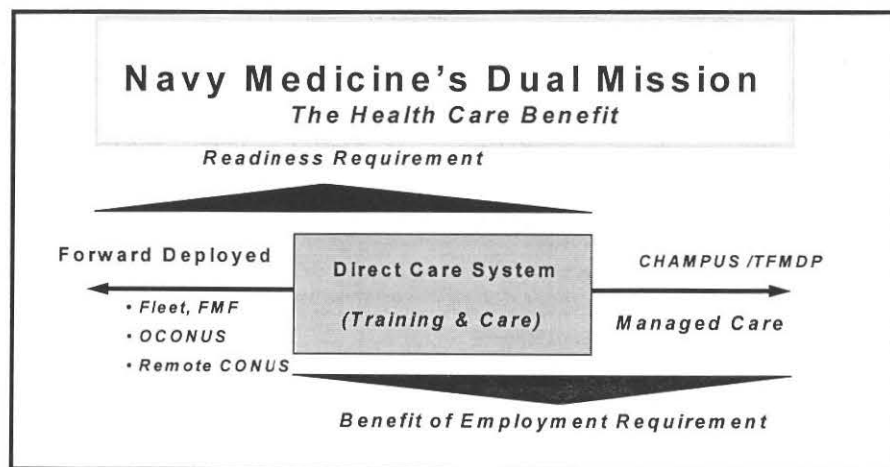


Figure 1

deployable units or located at OCONUS sites. In addition, of the personnel assigned to CONUS, 42 percent have mobilization contingency assignments (see Figure 2).

Navy medicine has always "followed the fleet" in an attempt to locate its limited direct care system resources to best serve major concentrations of beneficiaries and OCONUS and remote CONUS locations where alternative sources of care are not available. The current health care delivery infrastructure includes 9 OCONUS hospitals, 2 remote CONUS hospitals, 3 tertiary care medical centers, 4 family practice teaching

hospitals, 11 community hospitals, 173 clinics and ambulatory facilities, and 157 DTFs under the Bureau of Medicine and Surgery located in 32 states, 2 U.S. possessions, and 6 foreign countries. In addition, there are medical research units in Egypt, Peru, and Indonesia.

A type of capitation-based financing is being used in the military health system. The key to providing an accurate capitation financing structure is to be able to determine the number and type of beneficiaries using the system. However, for the military services, it also must take into account the differing medical readiness

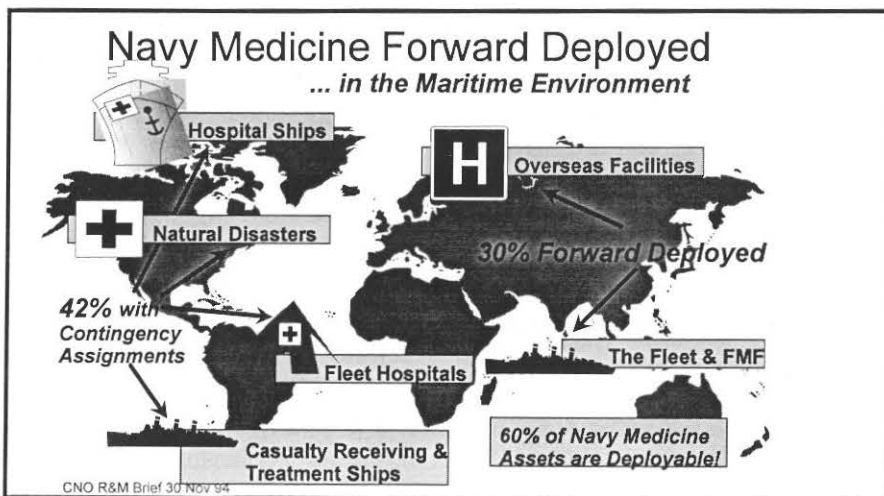


Figure 2

TOTAL NAVY MEDICAL DEPARTMENT BENEFICIARIES WORLDWIDE

Category	Facility	FY-94 population served	FY-2001 projected population
Medical Center (Teaching)	Bethesda	89,218	86,125
	Portsmouth	319,282	308,185
	San Diego	282,511	277,521
Family Practice (Teaching)	Bremerton	55,761	63,208
	Camp Pendleton	121,733	130,201
	Jacksonville	133,295	120,899
100+ Beds	Pensacola	66,034	71,569
	Camp Lejeune	93,620	97,647
	Great Lakes	70,824	63,001
50-99 Beds	Okinawa	40,855	46,124
	Guam	21,294	18,240
	Rota	5,767	5,663
25-49 Beds	Yokosuka	21,420	18,558
	Beaufort	32,083	34,726
	Charleston	93,395	67,430
<25 Beds	Cherry Point	31,400	38,994
	Corpus Christi	24,991	27,533
	Groton	40,331	41,117
BRAC Locations	Lemoore	25,991	34,767
	Millington	40,630	38,119
	Naples	7,979	6,009
Total Catchment	Oak Harbor	27,945	24,994
	Roosevelt Roads	8,088	7,613
	Twentynine Palms	21,723	21,615
Total Non-Catchment	Guantanamo Bay	4,015	3,750
	Keflavik	4,914	4,683
	Newport	32,591	31,846
Total Service Obligation	Patuxent River	14,165	14,939
	Sigonella	4,556	4,312
	Adak	2,648	0
Source: RAPS version 8.1	Oakland	95,521	0
	Orlando	76,476	0
	Total Catchment	1,911,056	1,709,388
Total Non-Catchment	Total Non-Catchment	679,074	761,346
	Total Service Obligation	2,590,130	2,470,734

Table 1

costs of the services and the different ways base operating support costs are treated by each service. To meet our need for accurate beneficiary information, the Navy Medical Department uses the Resource Analysis and Planning System. This system provides current estimates and future projections of population by beneficiary category, age, and gender, at zip code, catchment area, state, CONUS, and OCONUS levels. Table 1 reflects the current and projected number of Navy Medical Department beneficiaries by location.

With force rightsizing, base closures, increased costs, decreased funding, and an aging beneficiary population, more care is being shifted from the direct care system to civilian sources where cost, quality, and access have been difficult to control. While care for all beneficiaries is free (beyond the \$7/day subsistence for inpatient meal service) within the direct care system, considerable cost sharing—in the form of deductibles, copayments, and sometimes, balanced billing of unreimbursed charges—is involved under alternative care ar-

rangements. Table 2 lists potential cost sharing under current CHAMPUS regulations.

This shifting of care has created the perception of an erosion of benefits and a breach of the long-standing promise offered as an inducement to a naval career commitment, especially among older retirees. The priorities for care within the direct care system's limited capacity are: (1) active duty servicemembers, (2) their family members, and (3) survivors, retirees, and their family members. However, differences exist from one location to another in the types and amount of services available in the direct care system and under alternative arrangements. Although the delivery system stratifies access to direct care facilities by beneficiary class, within the same class the same level of benefit (including access, cost, and quality) should be available. In reality, which beneficiaries are a priority, for what type of services, and when the services will be available within the direct care system varies widely by location.

Navy Medicine 2001

The Future Requirements

The Navy Medical Department of 2001 will have the same dual mission it has today: to assure the availability of healthy people to meet the Navy's wartime and day-to-day operational readiness mission, and to provide a comprehensive health care benefit to all military services' beneficiaries. While the readiness mission remains paramount, military force rightsizing initiatives such as the Section 733, Defense Authorization Act of 1992 and the 1995 Commission on Roles and Missions study require a renewed strategic focus on manpower requirements in the direct care system. The results of Base Realignment and Clo-

sure Commission (BRAC) recommendations will affect the availability and demand for direct care and alternative care system use. Also, there will be significant changes in beneficiary demographics. Although the overall number of beneficiaries will decrease slightly, the percentage of beneficiaries over age 65 (the highest per capita consumers of health care) will increase 17 percent (see Table 3).

The national health reform debate and Congressional interest in a Federal Employee Health Benefit Plan (FEHBP) alternative for military beneficiaries will increase awareness of the need for a more uniform health care benefit. Increasing costs of medical care and declining defense budgets will demand an increased focus on efficiency and effectiveness in health care delivery. Navy medicine has reexamined its vision, mission, goals, and objectives with a newly completed Strategic Plan as the framework for addressing each of these issues.

How Future Requirements Will Be Met

Total Health Care Support Readiness Requirements (THCSRR). To meet the readiness requirement of our dual mission, Navy medicine must provide adequate manpower resources to deliver a high quality health care benefit to operational forces of the fleet and Fleet Marine Forces. These resources must be of the appropriate number and specialty mix to accommodate the expected casualty flow generated under current or future wartime scenarios and to provide medical support for routine daily operations. The THCSRR model has been developed to ensure the future capability of providing this important health care benefit to active duty sailors and marines. The THCSRR cal-

CHAMPUS BENEFICIARY COST SHARING		
CATASTROPHIC CAP*	Active Duty - \$1000/FY	Retiree - \$7500/FY
OUTPATIENT CARE		
ACTIVE DUTY FAMILY		
Deductible (E4 and below)	\$50/Patient or \$150/Family/Year	
Deductible (E5 and above)	\$150/Patient or \$300/Family/Year	
Copayments	Participating Provider 20% of Allowable Charge 100% of Non-Covered Services	Non- Participating Provider 20% of Allowable Charge 100% of Non-Covered Services 100% of Disallowed Charges**
RETIREE AND FAMILY		
Deductible	\$150/Patient or \$300/Family/Year	
Copayments	Participating Provider 25% of Allowable Charge 100% of Non-Covered Services	Non-Participating Provider 25% of Allowable Charge 100% of Non-Covered Services 100% of Disallowed Charges**
INPATIENT CARE		
	ACTIVE DUTY FAMILY	RETIREE AND FAMILY
Hospital Charges	\$9.50/day or \$25 minimum and 100% of Non-Covered Services	\$323/day or 25% of Billed Charges
Professional Fees	100% of Disallowed Charges** 100% of Non-Covered Services	25% of Allowable Charges 100% of Disallowed Charges** 100% of Non-Covered Services

Table 2 *The catastrophic cap is the maximum amount of allowable charges for covered services that any family will have to pay for any combination of inpatient and outpatient care.

**By law, non-participating providers may bill no more than 115 percent of the CHAMPUS allowable charge for professional services.

culates the minimum active duty medical endstrength required to meet both parts of the readiness mission, namely, wartime requirements (currently two major regional conflicts) and the day-to-day operational health care requirement in support of deployed DON units, OCONUS and isolated CONUS medical and dental facilities, and the necessary rotation base. In addition, the THCSRR has a sustainment component, to meet training requirements and to account for expected attrition and personnel down-time due to transfer, illness, or other uncontrollable events. The THCSRR also provides additional resources during peacetime to sup-

port the benefit of employment mission. While it is a floor and not a ceiling, implementation of the THCSRR plan is essential to accomplishment of the readiness mission. The full implementation of TRICARE (DOD's regional managed care program) is essential to meet the total benefit of employment mission.

The Uniform Health Care Benefit: TRICARE. The Navy Medical Department is cooperating with the other military services' medical departments in development and implementation of TRICARE. TRICARE brings together the health delivery systems of each of the military services, as well as CHAMPUS, in a

RETIREE POPULATION PROJECTIONS				
	FY 1995	FY2000	DIFF	% DIFF
Total 65 and over	323,717	380,340	56,623	17%
Total ret, dep/ret, survivors	1,155,212	1,199,863	44,651	4%
Source: RAPS 8.1	Navy Medical Department Beneficiaries			

Table 3

collaborative effort to better serve our patients and to better use the resources available. Achieving the goals of the TRICARE program will provide a health care benefit that improves access, assures the reliability of high quality, consistent health care services for all beneficiaries, preserves choice for all nonactive duty participants, and contains overall health care costs.

The TRICARE health benefit is structured under four broad management themes designed to provide MTF commanders the tools, authority, and flexibility to better manage the delivery of health care to their beneficiaries. These themes are: (1) division of the Military Health Services System (MHSS) into 12 health services regions, (2) development of standard HMO, PPO, and FFS managed care options, (3) transition to capitation-based resource allocation, and (4) transition to fixed-price managed care support contracts. The system envisioned under these four themes must adhere to strict guidelines for beneficiary travel time, appointment waiting times, and availability of emergent, urgent, and specialty care. A key issue is the continued provision of this benefit to retirees aged 65 and over, who lose their eligibility for CHAMPUS. Congressional authorization is necessary to allow reimbursement of the MHSS by Medicare for the cost of care to these Medicare-eligible retirees.

Infrastructure Study. In implementation instructions to the Program Decision Memorandum, "Decisions on Defense Health Program," dated 22 Sept 1992, the Deputy Secretary of Defense directed that medical expenditures be reduced through economies and efficiencies. A 1984 GAO report, based on previous studies of nonfederal facilities, established a correlation between hospital size and

economy of operation; the smaller a hospital's size the less economical it was to operate. A 1993 OASD(HA) study of 57 triservice facilities further supported this finding. The report recognized that a decision to convert small military hospitals to ambulatory care facilities should be based on economic factors and other considerations such as mission requirements, availability of alternative sources of care, and impact on beneficiaries. Navy medicine conducted an analysis of 10 small (less than 50-bed) hospitals upon notice that the Future Year Defense Program 1996 funding projected for Navy health care operations was dramatically short and possibly inexecutable.

Five of the ten small hospitals studied are being considered for rightsizing to ambulatory care facilities. These hospitals are located in Charleston, SC; Corpus Christi, TX; Groton, CT; Millington, TN; and Patuxent River, MD. Rightsizing of these hospitals will not compromise care to the fleet/FMF nor adversely affect the health care benefit to family members.

The infrastructure study models indicate that per capita costs for care will not increase with the recommended changes. If implemented, approximately 375 active duty personnel displaced from these facilities will be available to offset existing contract personnel requirements at larger facilities. Approximately 750 personnel will be available to satisfy requirements of understaffed Navy Medical Department units both in and out of CONUS. Physicians assigned to the rightsized ambulatory care facilities would have privileges to admit and care for beneficiaries at local civilian hospitals. Successful rightsizing is dependent on implementation of TRICARE within the regions of these hospitals.

Ambulatory Care and Taking Care to the Deckplates. Navy medicine's goal is to deliver health care services and provide the health care benefit in a way that meets our customers' needs in a cost-effective manner. This means delivering health care as close as possible to where our sailors and marines are working, using the appropriate mix of providers and technology. Patients should not be moved through echelons of care unless it is absolutely necessary to get them well. Every time this happens unnecessarily it drives up costs and takes sailors and marines away from their workplace and potentially affects their unit's mission accomplishment. Our providers—not just physicians but also other highly trained providers such as nurse practitioners, physician's assistants, and independent duty corpsmen—will be operating and delivering the health care benefit in clinics and with the operating forces directly. They will no longer be as tied to the hospital setting. Our goal is to move ambulatory care to the deckplates and to the family member.

A prime example of taking care to the deckplates is occurring at the Naval Academy where corpsmen are now assigned to every midshipmen battalion to hold sick call in the residence halls. In this way, only those middies that absolutely need to take time out of their academic day to visit a provider at the Naval Medical Clinic Annapolis will actually do so. This keeps them in class more and reduces clinic waiting time.

Moving Information Not People. The smart application of new and existing technology can greatly leverage Navy medicine's ability to accomplish its mission and provide the health care benefit. It may be characterized as using technology to move information not people. The best examples of this are ongoing

uses of telemedicine. During a recent deployment of USS *George Washington*, more than 30 medical evacuations were avoided using tele-radiology to digitize and transmit X-rays and other patient information—rather than the patient—to and from the National Naval Medical Center for specialty consultation. These actions kept 30 sailors on station, saved money, and helped maintain readiness. These principles have applicability worldwide and can benefit all DON beneficiaries.

Concerns for the Future

Implementation of the Navy Medical Department Strategic Plan will be key to providing a high quality health care benefit to our beneficiaries. When combined with Navy medicine's ongoing responses to change, it defines not only the vision for the future of the health care benefit, but what we have to accomplish to get there. While there is much that Navy medicine can control, there are some issues which require outside help.

1. Implementation of the THCSRR at or above its floor manpower levels. Recent studies (the Section 733, National Defense Authorization Act for FY92 and FY93, and the 1995 Commission on Roles and Missions) have recommended staffing levels that do not take into consideration *total* uniformed medical manpower requirements. The Navy Medical Department is convinced that the implementation of the THCSRR is the best solution to balancing wartime readiness and contingency requirements, with the benefit of employment requirement to our beneficiaries OCONUS and CONUS. Considering the endstrength pressures which DON and Navy medicine face, this approach will continue to put our active duty medical assets where they need to be to best serve our beneficiaries at

DON's major active duty and other beneficiary concentrations in CONUS, OCONUS, and in isolated areas. Utilization of the THCSRR methodology will ensure that Navy medicine has the necessary manpower to support fleet and FMF operational and readiness requirements, meet OCONUS and remote CONUS activities' staffing needs, and provide the minimum necessary CONUS rotation and sustainment base.

2. Full implementation of TRICARE. Several events have caused concern that the successful implementation of TRICARE may be in jeopardy. The Commission on Roles and Missions questioned TRICARE's ability to provide sufficient choice and access to beneficiaries living outside MTF catchment areas, and to establish a competitive environment that would foster more efficient health care delivery. Without Medicare subvention, more DOD funding will be required to continue to care for Medicare eligible retirees. However, because of fiscal pressures on Medicare, many consider favorable legislation highly unlikely at this time. Program Review decisions causing fluctuations in Defense Health Program funding may affect TRICARE implementation. Recent report language from the Senate Appropriations Committee (although later amended in conference) forbid any request for proposals for TRICARE managed care support contracts from being released during FY96.

Implementation of the THCSRR alone will not optimize delivery of the health care benefit of employment. Timely execution of TRICARE is essential to prevent compromise of the health care benefit during THCSRR implementation and infrastructure rightsizing. This will require successful and full implementation and funding of TRICARE. Also,

key to the future health care benefit for our retirees is Medicare subvention, which will let our Medicare-eligible beneficiaries enroll in TRICARE Prime (the MHSS HMO-type option) and share in its benefits.

3. Senior line leadership should influence their sailors and marines to enroll their families in the TRICARE Prime option. Key lobbyists and legislators have adopted the Congressional Budget Office argument that TRICARE would be a lesser alternative to FEHBP eligibility, in spite of FEHBP's excessive cost to our beneficiaries at current government cost-sharing levels. TRICARE Prime offers the greatest assurance to our deployed sailors and marines that they won't have to worry about cost, quality, or access to health care for their families.

4. Approval of rightsizing initiatives. Navy leadership support of Navy medicine's rightsizing initiatives, such as the infrastructure study and BRAC, will optimize scarce medical personnel use by putting them in areas of greatest active duty and other beneficiary concentrations.

5. Proliferation of new technologies. Navy leadership support of funding for cost-effective technology, especially telemedicine and improved medical information management systems, and shifts to ambulatory care will put the right care at the right place at the right time to keep our sailors and marines on duty and provide a more consistent and cost-effective benefit to all our beneficiaries.

A complete copy of the Navy Medical Department input to the Department of the Navy Quality of Life Master Plan may be obtained by contacting CDR Jeff Bashford (BUMED-811) at DSN: 762-3346, Commercial: 202-762-3346, or via E-mail at nmc8bja@bms230.med.navy.mil. □

The *Leaner, Meaner, Lighter,* *Faster* Medical Battalion

LT Tom McCoy, MSC, USN

Marines and sailors from Second Medical Battalion, Second FSSG, MARFORLANT, Camp Lejeune, NC, have recently field tested some of the proposed restructuring of medical battalions. Among these changes are the addition of Shock Trauma Platoons (STPs) to the Headquarters and Support (H&S) Company and a re-emphasis on providing Echelon II medical care in the Surgical Companies. Lessons learned from Desert Shield/Storm were incorporated in the 1993 Mission Area Analysis of Health Services and highlighted the logistical problems inherent to any operation. From this Mission Area Analysis came the proposed reorganization of the Medical Battalions.

Medical Companies designed to work close to the Forward Edge of the Battle Area (FEBA) were increasing their medical capabilities to Echelon II+ and subsequently increasing the strain on logistics and other support. With the Marine Corps emphasis on lighter and faster forces deployed in rapidly moving, short duration scenarios, Navy medicine had to develop plans to support these types of operations. Making a "lighter" medical

footprint has not been easy, but early indications of the reorganization look very promising.

Restructuring the Medical Battalions has brought about the need for training all personnel assigned to the Fleet Marine Force (FMF) Medical Augmentation Platform. Second Medical Battalion recently embarked on this effort by conducting the first actual surgery during a field exercise in September 1995.

The Second Medical Battalion, commanded by CAPT Carl Hooton, MSC, in close coordination with CAPT Michael L. Cowan, MC, commanding officer of Naval Hospital Camp Lejeune, NC, set up a field surgery unit from "C" Company on the compound of the hospital. After several safety and health care-related inspections, the green light was given to begin performing minor surgery in this field setting. Medical augmentees from Naval Hospital Camp Lejeune were given the unique opportunity to use the equipment they would use during a real world scenario under the conditions they would face in the field environment. Surgeons from the hospital screened their active duty population and selected

12 suitable minor surgery patients. The entire exercise was conducted over a 5-day period and included tours by VIPs and other interested parties. Among the VIPs was Navy Surgeon General VADM Harold Koenig and RADM Dennis Wright, Medical Officer for the Marine Corps.

Overall, the exercise was a tremendous success, resulting in invaluable training and several lessons learned to improve future training and real world evolutions. Patients, staff, and visitors were pleased with the operation and surprised by the capabilities and cleanliness of the facility. An unexpected benefit of the exercise was the apparent comfort level it provided to marines, sailors, and their families. Said one high school student "my dad is a Marine and this makes me feel much better about his job just knowing what kind of care you are able to give him if he needs it." Perhaps this exercise was best summed up by the words of SGT Kelvin Roberts, one of the 12 patients, who said, "The operation I received was surprisingly painless. As I walk out of here, I am fully aware of what doctors and corpsmen are capable of doing for Marines."



RADM Dennis Wright, Medical Officer of the Marine Corps, discusses the exercise with VADM Harold Koenig, Surgeon General of the Navy, in the operating room of "C" Company, Second Medical Battalion, during the mock moulage surgery.

A more significant test of the reorganization came in October 1995 when Second Medical Battalion conducted an exercise that involved the entire H&S Company, "C" Company, two STPs, and 83 medical augmentees assigned to Second Medical Battalion from various naval MTFs. The goal of this exercise was to physically combine two STPs and "C" Company, simulating movement within the FEBA and advancing of friendly forces. Several scenarios were run throughout the 10-day field exercise, including detaching a surgical unit from "C" Company and placing it with one of the STPs.

The STP is the newest component in the Medical Battalion organization and this was the first true test of its capabilities. The mission of the highly mobile, ATLS intensive STP is to augment, reinforce, or replace the Battalion Aid Station (BAS), allowing the BAS to move forward in support of the unit to which it is attached. While deployed, the STP will collect, triage, and stabilize patients with Echelon I care. Composed of a four-bed trauma unit and six-bed holding area, the STP is initially supplied to treat up to 100 casualties. It can hold patients up to 6 hours awaiting medevac, but generally evacuates patients very rapidly using lifts of opportunity. The STP will receive/collect patients from

the BAS and once stabilized, will move the patient to a higher echelon of care, normally a Surgical Company. Evacuation will continue as needed to increasingly higher echelons of care as required by the patient's injuries (Figure 1). Many of the exercise's participants including ENS Tim Burnham, MSC, a physician's assistant from Naval Hospital Groton, CT, praised the STP concept. He believes "the STP concept is very feasible and work-

able, and very well organized." ENS Burnham pointed out that "this was a great experience and good training, and a good time to work out the bugs."

During this exercise, marines and sailors organic to Second Medical Battalion and the medical augmentees were exposed to a rigorous training schedule. All personnel received training in nuclear, biological, and chemical (NBC) defense including a field gas chamber evolution. They were also tasked with setting up, operating,

CONCEPT OF EMPLOYMENT

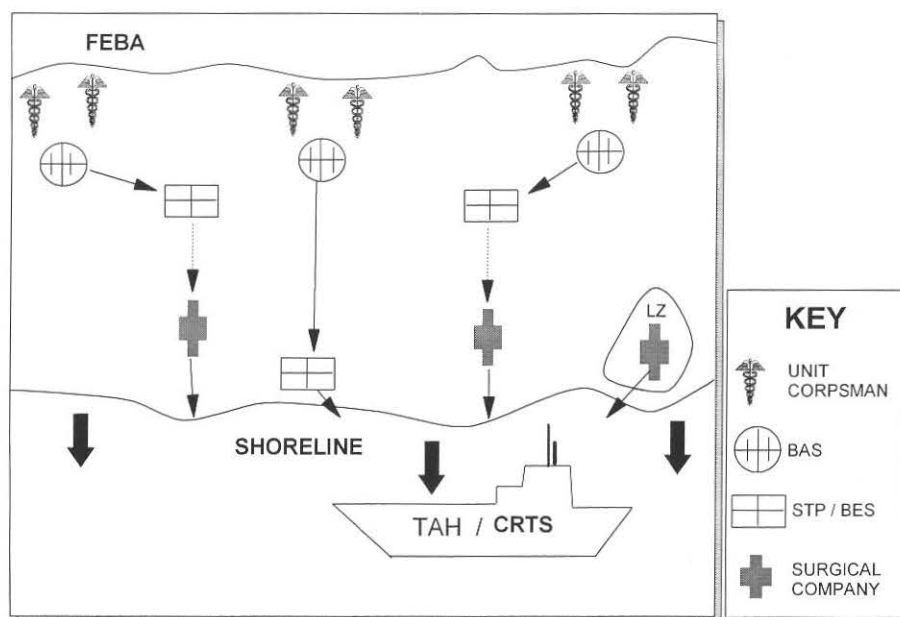


Figure 1

tearing down, and moving STPs and the Surgical Company on several occasions. For most of the personnel involved, this was their first hands-on experience with an STP. For many, it was their first experience with life in the field with the FMF, such as LTJG John Daniels, an MSC from Naval Hospital Cherry Point, NC. After completing this week's exercises, LTJG Daniels said, "I have a better idea of how the FMF works; I was most impressed by how big the operation is and how fast it could be moved and set up."

Several casualty scenarios were run day and night, culminating in a mass casualty exercise. By the end of the exercise, 109 casualties had been run through the system, including NBC casualties and casualties that had to be held by the STP while it moved, adding to the complexity of the operation. Further adding to the intensity of the situation was the use of CS canisters simulating gas attacks during the mass casualty drill. HM3 Neal Lacy from Naval Hospital Portsmouth, VA, and assigned to the OR of "C" Company concurred with the intensity level he experienced. "This was a great learning experience, with great interaction with the docs. It was more stressful than I expected and more realistic." By week's end, everyone involved had received a significant amount of training in a short period of time. A bond developed between the organic staff and the augmentees. CDR Martin Robinson, NC, from Quantico, VA, who worked in "C" Company's ward said, "It's not we or they, it's us." CDR Robinson went on to say that "it's a good concept to integrate the organic staff with the augmentees." This was reflected by HN Eric Czyszczak an organic corpsman of "C" Company. "It's good to work with augmentees because it gives you a chance to know



The Surgeon General discusses laboratory equipment procedures with HM2 Franco.

the people on the platform that you otherwise don't see."

In addition to the STPs, the former Collecting and Clearing Companies have also undergone reorganization and are now referred to as Surgical Companies. Surgical Companies will be composed of a triage/evacuation platoon, a surgical platoon, a holding platoon, a combat stress platoon, and an ancillary services platoon. Most of the changes will involve the number of personnel assigned and their specialties. Both the surgical platoon and holding platoon will consist of three surgical sections and three ward sections respectively, staffed for two 12-hour shifts with the capability to split into two units, greatly enhancing mobility and forward deployability. Likewise, the ancillary services platoon will consist of two each of an X-ray section, lab section, and pharmacy section. Should the Medical Battalion be deployed, a dental platoon will be assigned to augment the battalion's diverse capabilities. The battalions will be composed of 2-3 Surgical Companies, in addition to

their H&S Company. Pastoral care personnel will decrease as will the Marine contingent normally assigned to the battalion.

The recent exercises conducted by Second Medical Battalion have proven invaluable in preparing organic and augmentation medical personnel and marines for future contingencies that will arise. The opportunity to work together with the equipment issued and under the conditions similar to what occurs in a real world scenario long before that scenario arises will have significant benefits when that time comes. LCDR William McCrea, MC, from the anesthesia department at Naval Hospital Camp Lejeune, commented on Field Ex 1-96. "The casualty play went well and was a valuable experience for the corpsmen treating casualties under the conditions and scenarios expected on a battlefield." He added, "the opportunity to break open the AMAL cans and see what we take to the field is invaluable." LCDR McCrea then summed up the experience. "It was an excellent opportunity to gain an understanding and appreciation for how the Marine Corps supports medical: We cannot do it without them."

This marks the beginning of the reorganization of the Medical Battalions. Each exercise and operational commitment will offer the opportunity to fine-tune and improve the system. Continuous improvement will eventually lead to the *leaner, meaner, lighter, faster* Medical Battalion, and ensure that Navy medicine provides the best health services possible to the Fleet Marine Force. □

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Military Transfusion Medicine

Barry J. Spargo, Ph.D.
LCDR Francesca C. Music, MSC, USN

Transfusion medicine has evolved from the simple transfer of life-sustaining fluids from one individual to another dating back to Dr. James Blundel in 1818, to the sophisticated transfusions of both natural (donor) and synthetic hemostatic agents of today. Hemostatic agents include whole blood, packed red cells, plasma, platelets, and clotting factors (cryoprecipitate, fibrin glue) and are used daily in hospitals and triage units across the country. To provide these materials to both urban and rural communities, the United States has developed a national network of military, public, and private blood banks that intersect one another to provide an adequate and stable supply of blood products for the nation. We are no longer dependent upon the donor being within a few feet of the recipient as we were in the early decades of blood transfusion.

For the military, the use of blood and blood products in the field has

varied significantly during the 20th century, as has the technology in transfusion medicine. Of the significant U.S. military conflicts, the two most recent (Vietnam and Desert Shield/Storm) diametrically identified the need for new and innovative tools for providing hemostatic agents to an injured soldier in the theatre at an echelon where blood and blood products could provide during the "golden hour."^{*}

Utilization of blood products during U.S. military interventions varies dramatically. (1) During World War I and II the primary blood product used in resuscitation therapy was plasma. It wasn't until the end of World War II that red blood cells were used for wounded soldiers as a primary resuscitation product. Almost 700,000

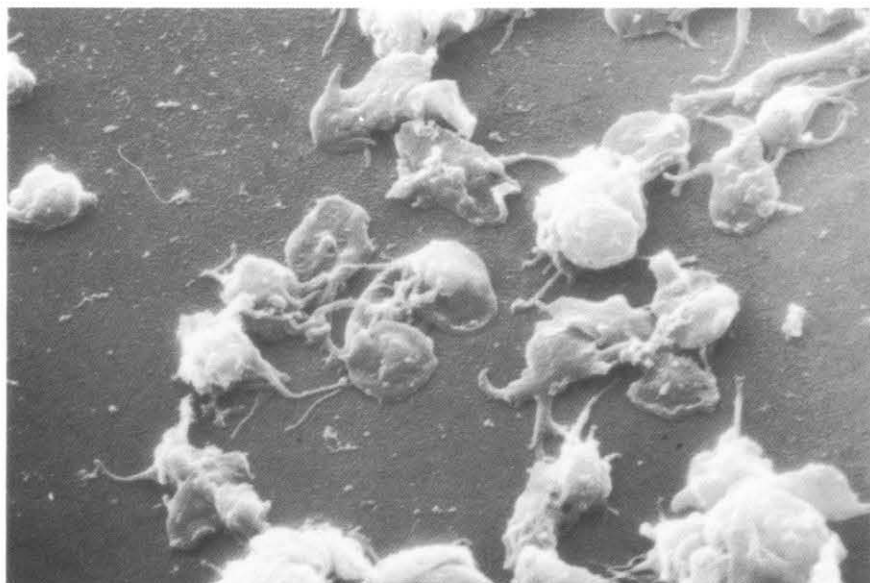
units of blood collected in World War II (205,000 in Europe, 181,555 in the Pacific, and 310,135 in the United States). In the Korean Conflict 397,711 units of blood were collected between 1950 and 1953. However, during the period 1967-1970 in the Vietnam war, 1.5 million units were collected in the United States (all were collected by military blood collecting facilities) and an additional 25,000 units were collected on U.S. Navy ships. Approximately 128,000 injured soldiers were transfused with 550,000 units of red cells. In the most recent conflict Desert Shield/Storm, 73,000 units (all collected by military blood collecting facilities) were transported to the theater, yet only 2,000 units were transfused (primarily to Kuwaiti and Iraqi Nationals).

Transfusion Materials of the Future

Emerging state-of-the-art technologies in transfusion medicine and blood banking in particular can be divided

^{*}The "golden hour" is defined as the critical period following an injury, particularly hemorrhaging, where life-sustaining assistance (such as controlling the hemorrhage, administration of blood products, etc.) results in decreased mortality.

Scanning electron micrograph (SEM) of reconstituted freeze-dried platelets adhering and spreading on glass



Marjorie A. Read

into two categories: (1) Improved Storage/Shelf Life of Human Donor Products; and (2) Artificial Resuscitative Fluids. Both of these general areas are under active research and development supported by the Naval Medical Research and Development Command (NMRDC).(2)

Improved Storage/Shelf Life of Human Donor Products. In the early 1950's, studies in the field of cryobiology* made possible the storage of red blood cells below -65°C for 10 years. CAPT Robert Valeri, MC, USNR (Ret.) at the Naval Blood Laboratory, Boston, MA, has been instrumental over the past several decades in the development and implementation of an FDA-approved freezing solution and protocol internationally used by the armed services and civilian blood banks. Currently, 58,000 units of frozen blood are in storage in military blood product depots and on

Navy ships. Frozen blood in the civilian sector is primarily used for long-term storage of rare blood types and to a lesser degree autologous blood.

Storage of frozen red blood cells for 10 or more years greatly improves the stability of the military blood supply by providing pre-positioned pre-tested units. However, frozen blood has several associated limitations and disadvantages. Frozen blood is not easily deployed and depends on a constant and significant energy requirement to maintain super-cooled freezers at -65°C . Thawed red blood cells must be processed immediately to remove cryoprotectant agents prior to the transfusion, a process that can take up to an hour for each unit of blood. Additionally, thawed, processed red blood cells have an FDA-approved shelf life of 24 hours, which make remote processing (as was done in U.S. military staging installations in Europe for DS/S) impractical.

Development of novel biocompatible, readily transfusable cryoprotectant solutes is ongoing. Dr.

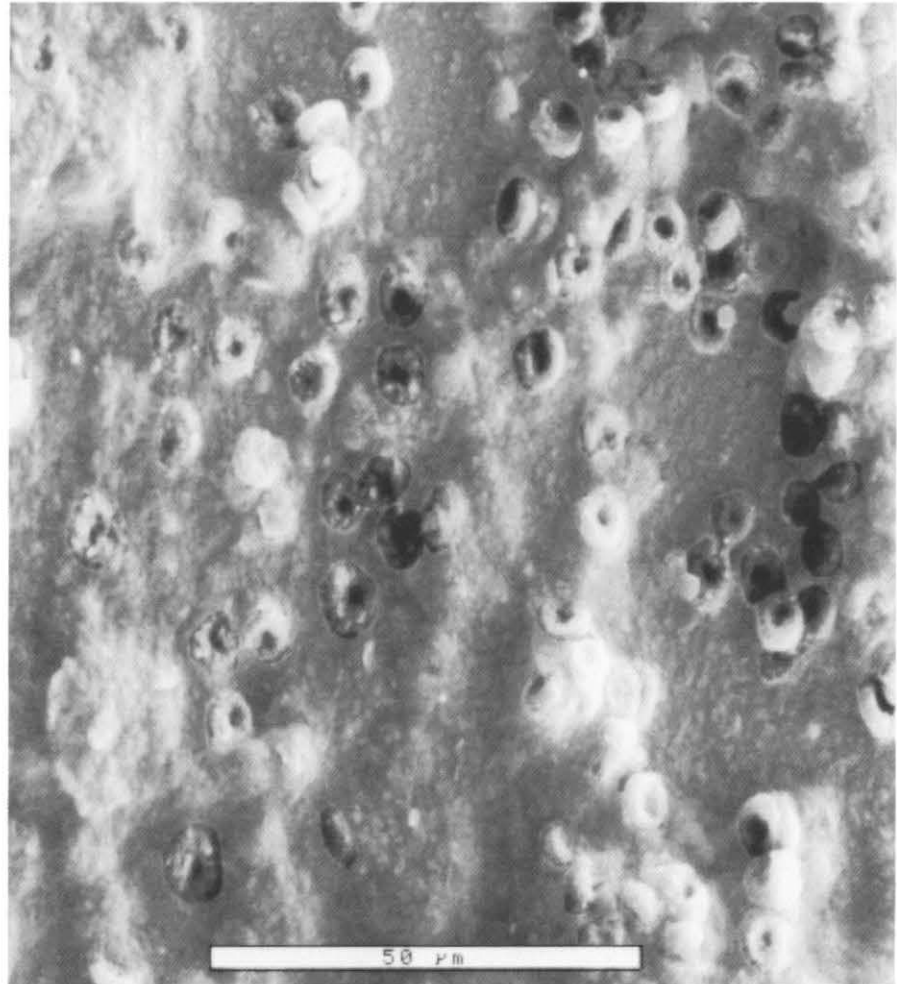
Harold Meryman and his group at the Naval Medical Research Institute (NMRI), Bethesda, MD, (formerly of the U.S. Red Cross, Rockville, MD) are developing transfusion-compatible solutes for freezing red blood cells. Basically, a one-step process is used where the solute is mixed with red blood cells, frozen, subsequently thawed and transfused without the necessity of post-thaw processing.

Dr. Meryman has also been instrumental in our understanding of red cell metabolism, namely the effects of ionic solutes on the up-regulation of 2,3-diphosphoglycerate (2,3-DPG) and adenosine triphosphate (ATP), two key red cell metabolites. With these data as well as other information, the development of solutions that increase the liquid storage shelf life from the current 42 days to 150 or more days is likely by the turn of the century. Increasing the shelf life of liquid-stored red blood cells will significantly increase the security of the military and the nation's blood supply.

*Cryobiology (cryo = freeze) is the study of biological freezing. Examples of freezing in nature include arctic bacteria/algae and amphibians in the frozen tundra.

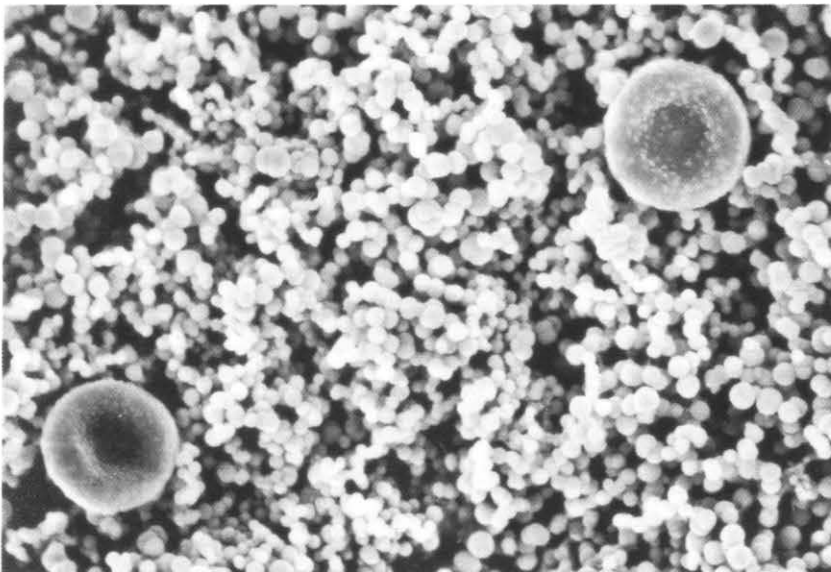
Scanning electron micrograph of freeze-dried red blood cells. (Scale bar = 50 microns)

Other mechanisms to increase shelf life of red blood cells and platelets are being developed. Freeze-dried red blood cells and platelets are under development by several groups. Dr. Barry Spargo at the Naval Research Laboratory, Washington, DC, is developing a transfusion-compatible freeze-drying solution for one-step processing of red blood cells. Dr. Marjorie Read at the University of North Carolina, Chapel Hill and Dr. Arthur Bode at East Carolina University, Greenville, NC, are developing transfusion-ready freeze-dried platelets. Freeze-dried products have a distinct advantage over frozen products—storage requirements. Typically, freeze-dried products will: require storage between -20 and $+25^{\circ}\text{C}$, obviating the need for bulky, energy inefficient -65°C freezers, be packaged in smaller containers, and weigh a fraction of their original mass. The shelf life of the freeze-dried products is yet unknown, but will approach 10 years. It is likely that freeze-dried red blood cells and platelets can be



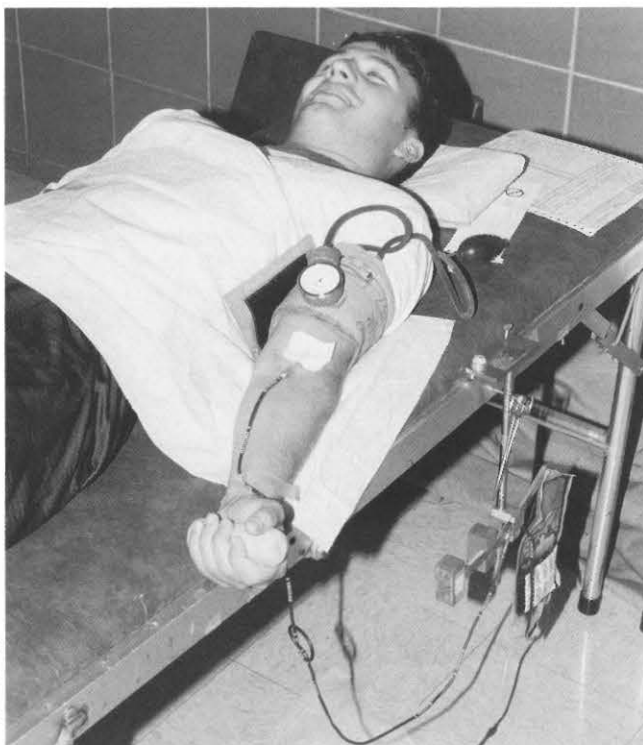
Barry J. Spargo

Alan S. Rudolph



SEM of liposome encapsulated hemoglobin (two human red blood cells shown for comparison)

Class of 1998 U.S. Naval Academy midshipman Jonathan Snavelly donates blood.



Barry J. Spargo

rehydrated as far forward as echelon 2 and transfused into the injured soldier.

Artificial Resuscitative Fluids

Artificial resuscitative fluids include those materials composed of synthetic chemicals, such as perfluorocarbons, and those composed of natural "human-derived" and/or recombinant technology-based products, such as stroma-free hemoglobin, cross-linked hemoglobin, and liposome encapsulated hemoglobin. All these materials readily carry oxygen to tissues of the body; however, questions remain as to the compatibility, clearance, and side effects of the products in humans. Blood substitutes will provide immediate life-sustaining fluids, but will not replace the utility of donor blood.

Dr. Alan Rudolph at the Naval Research Laboratory, Washington, DC, has demonstrated the efficacy

and compatibility of hemoglobin encapsulated in a lipid sphere (liposome). Liposome encapsulated hemoglobin (LEH) is approximately one-tenth the size of a red blood cell. It passes readily through the small capillaries and is removed by the reticuloendothelial system (RES) with a circulation half-life of 20 hours. LEH has been shown to markedly increase survival of rabbits and rats in 70 percent hemorrhagic shock models. LEH has recently been demonstrated safe for use in monkeys and will be evaluated for human safety and efficacy in clinical trials in the near future.

Conclusion

Increased shelf life of blood and blood products is an important component of military readiness. In the civilian sector, increased shelf life of fresh red cells and platelets will greatly improve the availability of these sup-

plies for elective and nonelective medical procedures. The development of freeze-dried products such as platelets, red cells, and plasma will reduce or eliminate the need for ultra-low temperature freezers and processing equipment on Navy ships, at Army battalion aid stations, and combat support hospitals. It will also reduce manpower requirements and transportation logistics.

These and other active research areas in military blood banking provide blood transfusion needs for military and humanitarian activities into the 21st century. Other research efforts in this area include the conversion of blood types A+, B+ and AB+ to the universal donor Type O being done at the New York Blood Center under Dr. Jack Goldstein. The use of stroma-free modified hemoglobin as a blood substitute is conducted under the U.S. Army by COL John Hess and Dr. Victor MacDonald at the Walter Reed Army Institute of Research, Washington, DC.

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Variation in Practice Patterns Within Staff Sick Call

Part 1: Common Diagnoses

CAPT James W. Allen, MC, USN
LCDR Richard Blumling, NC, USN

Services demanded and resources utilized are recurring themes in discussions of any managed care system. Civilian providers can obtain a quantitative view of diagnoses, therapies, medications, and dispositions from the National Ambulatory Medical Care Survey (NAMC). The National Center for Health Statistics conducts this yearly survey of 34,000 physician-patient encounters to nonfederally employed office-based practitioners.⁽¹⁾ Military providers have no yearly survey to judge the medical content of their ambulatory visits. We initiated a

descriptive study, patterned after the NAMC to describe diagnoses, therapies, medications, and disposition of physician-patient encounters in a typical sick call (SC), the primary care clinic that is the common entry point for active duty personnel into the military health service system. In this article we explore practice patterns in terms of frequency of diagnoses and overall rates for therapies and dispositions. We believe that administrators and providers who attempt to extract quantitative data about the operations of their clinics are more likely to successfully initiate changes in medical

practice and clinic management demanded by the shift to managed care operations.

Methods and Materials

Our study uses a questionnaire, similar to one used in the NAMC, attached to the charts of patients who entered staff sick call (SSC) at the Naval Medical Center, Portsmouth, VA, from 24 Sept 1994 to 10 March 1995. The questionnaire has six paragraphs with the first one capturing patient demographic information, which the registration staff completed. The second paragraph permits the

Table 1
Comparison of Distributions of the Active Duty Population
in the Catchment Area Assigned to the Naval Hospital Com-
pared With Questionnaires Received for Patient Visits to
Staff Sick Call.

	Naval Hospital	Staff Sick Call
Total	99,318 Population (*)	3,410 Questionnaires
Gender:		
Male	90%	55%
Female	10	44
Sponsorship:		
Navy/afloat	95%	98%
Army	2	1
Air Force	0	0
Marine Corps	2	0.4
Coast Guard	2	0.1
Others	1	0.5
Age distribution:		
18-24 years	41%	53%
24-34 years	39	33
35-44 years	18	12
45-64 years	2	2

(*) RAPS average FY94 baseline eligible population estimates.

provider to check one of 109 diagnoses coded in ICD-9, or write any specific diagnosis in free text. Paragraphs three through six permit the provider to check the diagnostic/services used, therapeutic services provided, medications prescribed, and patient disposition. The questionnaire accompanied the patient's chart during the clinic visit. To ensure uniformity of responses CAPT Allen provided monthly training sessions geared to the schedule of new interns who rotated through the service and LCDR Blumling provided end-of-day reviews of the questionnaires. In all, the 13 interns, 6 independent duty corpsmen (IDC), and six general medical officers (GMO) completed 3,410 questionnaires representing 47 percent of the 7,251 reported clinic visits. Catchment area for SSC is

4,022 active duty personnel, primarily Navy enlisted personnel associated with the medical center.(2)

Questionnaires originated from all providers and patient visits without preference for any one group. Table 1 compares the population, sponsorship, and age distribution for the 99,318 active duty personnel in the naval hospital's catchment area with the similar distribution for the 3,410 questionnaires. Distributions of sponsorship and age follow those of the hospital's catchment area population. Gender distribution shows that 44 percent of questionnaires represented patient visits from females, 10 percent of the active duty population.

Disease groups represent the hierarchy of individual diagnoses based on their three digit ICD-9 codes captured in paragraph two of the ques-

tionnaire. Fifty-four disease groups emerge from the 159 recorded diagnoses. Table 2 presents both frequency counts and disposition rates for those groups which account for 75 percent of initial visits. Beneath each disease group in parentheses is the most frequent diagnosis in the group.

Rates of visitation to SC represent the number of questionnaires corrected for the 47 percent sampling rate, then divided by the catchment area population of 4,022 personnel for the 5-month study period. The crude rate is 361 visits per 1,000 person-months (v/1,000 pm). Although gender distribution is not available for the SC catchment area, an approximation uses the Hospital Corps gender ratio. Females compose 23 percent of this corps(3) so an approximation for the SC catchment area is 20 percent female (804) and 80 percent male (3,218). Applying this ratio produces a gender-specific visitation rate of 795 v/1,000 pm for females and 245 v/1,000 pm for males.

Other measures developed from the questionnaire are the disposition of visits and prescribing level. Disposition rate, expressed for 100 cases of a specific diagnosis, are the physician requested, not administratively mandated, visits for followup care at SC or referral care at another clinic (Table 2). Prescribing level is also disease-specific and represent the percentage of visits for which the provider wrote at least one prescription. Antimicrobial (AMB) prescribing level is the number of antibiotics prescribed for an entire population. Prescribing level and AMB prescribing level permit comparison with other studies using NAMC.

Analysis of Diagnoses

Table 2 illustrates the range of pathology seen in SC. For example 20 percent of new patients present with

acute respiratory diseases (ARD) of which nasopharyngitis, ICD code 460.0 is the most common. The next most common disease groups are intestinal infectious disease (IID) and dorsopathies with viral gastroenteritis and low back pain (LBP) without radiation the most common diagnoses, respectively. Ill-defined symptoms (IDS), the fourth most common disease group, includes three symptomatic diagnoses of nearly equal frequency: abdominal pain, nausea and vomiting, and headache. ARD is twice as frequent during the winter months while the other diseases show less seasonal variation.

Providers will recognize the remaining nine disease groups as those associated with youth. Patients aged 19 to 36 years account for 90 percent of visits, with patients 19 to 20 years accounting for 21 percent of visits. Diseases such as otitis media, migraine headache, and a variety of muscle, shoulder, and knee injuries are as common in the 19- and 20-year-olds as the entire SC patient population. Contrast these diseases with the common diseases seen in the over 65-year-old at an Army Family Practice Clinic.(4) These senior citizens recognize hypertension, emphysema/COPD, diabetes mellitus, and degenerative joint disease as their common diagnostic clusters.

Comparison with another study of SC highlights important similarities and differences in the list of most frequent diseases. The Naval Health Research Center (NHRC) studied visits to SC aboard 89 ships on West Pacific cruises during June 1989.(5) Three of the four disease groups are similar in both the NHRC and SC studies.

ARC, IID, and IDS are among the top five diagnoses in both the ashore and afloat environments. Differences appear in skin disease which are more

Table 2
Disease Groups Sorted by Frequency of Initial Visits. (Beneath each group is the most frequent diagnosis in parentheses. Disposition rates are per 100 cases of that disease group for physician-requested followup visits and referrals to a specialty clinic.)

Disease Group	All Ages Initial Visits		Disposition Rates Per 100 Cases	
	Freq	%	Followup	Referral
Acute Respiratory (Nasopharyngitis)	477	20	18	2
Intestinal Inf Dis (Viral Gastroenteritis)	159	7	21	3
Dorsopathies (Low Back Pain Without Radiation)	159	7	25	16
Ill-Defined Symptoms (see text)	153	6	35	13
Physical Exam	144	6	7	6
Gen Medical Exams	116	5	5	19
Arthropathies (Knee, Meniscus)	103	4	31	19
Virus & Chlamydia (Viral Syndrome)	101	4	23	3
Ear & Mastoid (Acute Otitis Media)	94	4	23	4
Skin & Subcutaneous (Pseudofolliculitis Barbae)	68	3	32	28
Other Bacterial Dis (Strep Sore Throat)	58	2	22	0
Rheumatism (Rotator Cuff & Overuse Syndrome)	49	2	20	24
Inflammatory Dis, Skin (Contact Dermatitis)	46	2	22	11
Inflammatory Dis, CNS (Migraine Headache)	46	2	33	9
Sprain/Strain, Muscles (Ankle Sprain)	43	2	26	9
*All Other Diseases	593	25		
	2,409			

*Includes diseases of low frequency such as hypertension

frequent afloat and LBP which is more frequent ashore. Occupational factors may explain the difference since skin conditions are common in industrial settings, such as a ship, while acute LBP is common in health care workers,(6) such as those seen at SSC.

The diagnosis influences the disposition of patients visiting SC. Disease groups generating more than 25 percent followup visits are IDS, dorsopathies, arthropathies, skin and subcutaneous disease, inflammatory disease of the CNS, and sprains and strains. A provider can recognize

Table 3
Overall Prescribing Levels by Disease Groups Separated for SSC (1994) and NAMC (1985). (Units are the percentage of visits that had at least one prescription written.)

Disease Group	SSC	NAMC
Respiratory	83%	83%
Infectious	77	66
Musculoskeletal	82	60
Symptoms	65	48
Injury	71	42
Nervous System	80	53

many reasons for a return visit for patients with these diagnoses. Disease groups generating more than 10 percent referrals are primarily cases from disease groups requiring consultation to orthopedics or dermatology clinics.

Analysis of Prescribing Levels

The medical content of most clinics includes some level of pharmacologic therapy. To permit comparison with a NAMC 1985 study(8) we aligned diagnoses into broad disease groups. Compared to civilian providers, SC providers have the same 83 percent prescribing level for respiratory diseases but higher prescribing for all other disease groups (Table 3).

Another comparison between SSC and NAMC is the AMB prescribing level. From NAMC 1992 the age-adjusted annual AMB prescribing level ranges from 340 AMB per 1,000 population (a/1,000p) for 15- to 24-year-olds to 313 a/1,000p for 25- to 44-year-olds.(9) From SC 1995 the usage rate is 327 a/1,000p for a patient population that spans both NAMC age groups. The nearly exact match between the SSC usage rate and the NAMC benchmark indicates that military providers in SSC are using AMB at the same rate as civil-

ian providers treating similarly aged patients.

As with most clinics, providers come to SC with different levels of experience. Data from our study shows that experience level has little influence on the percentage of visits for a specific diagnosis that receive AMB therapy (Table 4). The one exception is nasopharyngitis for which GMO prescribe fewer ATB than interns.

Analysis of Therapeutic Services

While providers may be prescribing adequate drug therapy, non-pharmacologic therapies are also appropriate. Patients with mild, Stage 1, hypertension for example, may control their blood pressure by reducing sodium in the diet, increasing exercise, and losing weight.(10) Hypertension is a rare disease in SSC with only 17 initial visits. For these visits providers prescribed hypotensive agents for eight patients but only 6 of 17 recorded any dietary counseling and 5 of 17 recorded exercise counseling. While the data do not permit evaluation of the appropriateness of treatments the low use of patient counseling is a serious failure in health promotion. Only 2 percent of patients

on initial visit received any counseling about smoking cessation, in spite of the facts that 37 percent of Navy personnel smoke(11) and that COPD is a common disease of the age group over 65 years. In all disease categories the frequency of therapeutic services lags behind that for medications.

Changing Provider Behavior

Comparative and quantitative data derived from our study suggest three proposals for change in provider behavior. First is the value of preventive strategies. Analysis of disease categories shows ARD prominent in all SC settings and occupational diseases such as LBP and skin disease common in specific environments. Preventive strategies exist for these diseases. Since 19- and 20-year-olds account for 20 percent of all visits, boot camps provide an ideal environment to teach personal hygiene, skin care, and lifting techniques. As health care professional and military officers we need not accept as normal the doubling of ARD during the winter and a constant monthly loss of personnel to LBP.

Providers of curative medicine must reinforce the message of health promotion specialists. Counseling during the medical visit influences patients to enter programs for smoking cessation, weight control, and stress reduction. A growing number of civilian HMOs are refocusing on health promotion as a strategy to reduce future demand for medical visits.(12) With only 2 percent of visits offering counseling on smoking, the medical content must be enriched to include a more respectable partnership between curative and self-care approaches.

Comparisons of disposition rates and prescribing levels between clinics afford an opportunity for purpose-

ful change. Studies of other clinics using the NAMC format will provide uniform and quantitative data as illustrated in SC 1995. As these data become available, providers can compare disposition rates, prescribing levels, and use of therapies across similar clinics and diagnoses in order to gain insights into alternative management and treatment strategies. Prescription and disposition rates for clinics may become markers, as in Length of Stay for hospitals, a measure of overall operating efficiency.

Little Ticket Items

Because cost is a major concern, many hospitals control access to big ticket items such as specialized procedures and equipment. Little ticket items, such as prescription medication, followup visits, and referrals have often escaped attention. By definition, little ticket items are inexpensive. Consider the use of AMB in treatment of ARD. A randomized clinical trial found that a 3-day course of ATB is as effective as a 10-day course for acute maxillary sinusitis.⁽¹³⁾ At a cost of 50 cents per day for AMB the 7-day reduction in AMB use represents a savings of \$3.50, definitely a little ticket item. Extend the highly prevalent use of ATB, calculated for SSC as 326 a/1,000p, to the entire Navy catchment area in Tidewater of 99,138, results in a savings of \$113,116, which now qualifies as a big ticket item. Small alterations in referral rates for highly prevalent disease may have the similar effect of converting little ticket items into big ticket savings.

SSC treats the common diseases seen in the young adult population. The content of a SC visit illustrates opportunity for cost savings, such as a reduction in the duration of antibiotic use and provision of preventive patient counseling. The challenge is

Table 4
Prescribing Level for Antibiotics by Specific Diagnoses, Separated for the Three provider Groups. (ATB is the percentage of the n clinic visits that received a prescription for antibiotics.)

Diagnoses with ICD-9	Interns		IDC		GMO	
	n	ATB	n	ATB	n	ATB
Nasopharyngitis 460	192	14%	54	13%	134	5%*
Acute Sinusitis 461/473	76	72	42	67	58	71
Bronchitis 466	20	70	23	57	37	62
Acne 706	8	38	4	0	6	50
Otitis Media 381/2	5	40	7	71	2	50
Viral Gastroenter 008/9	117	3	74	0	69	0
Low Back Pain 724	84	0	33	6	67	0

Key: Provider groups
 Interns 13 Interns at SSC for 4-week rotations
 IDC 6 Independent Duty Corpsmen
 GMO 6 General Medical Officers
 * Significant difference with interns, p=.0097

identifying these opportunities and employing effective alternatives. The reward is obtaining big ticket savings from these little ticket items.

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CAPT Allen has available the questionnaires, data base, and software to extend the SSC study to other clinics. He can assist other clinics in completion of a cross-sectional study. His E-mail is ALLEN@usuhsb.usuhs.mil.

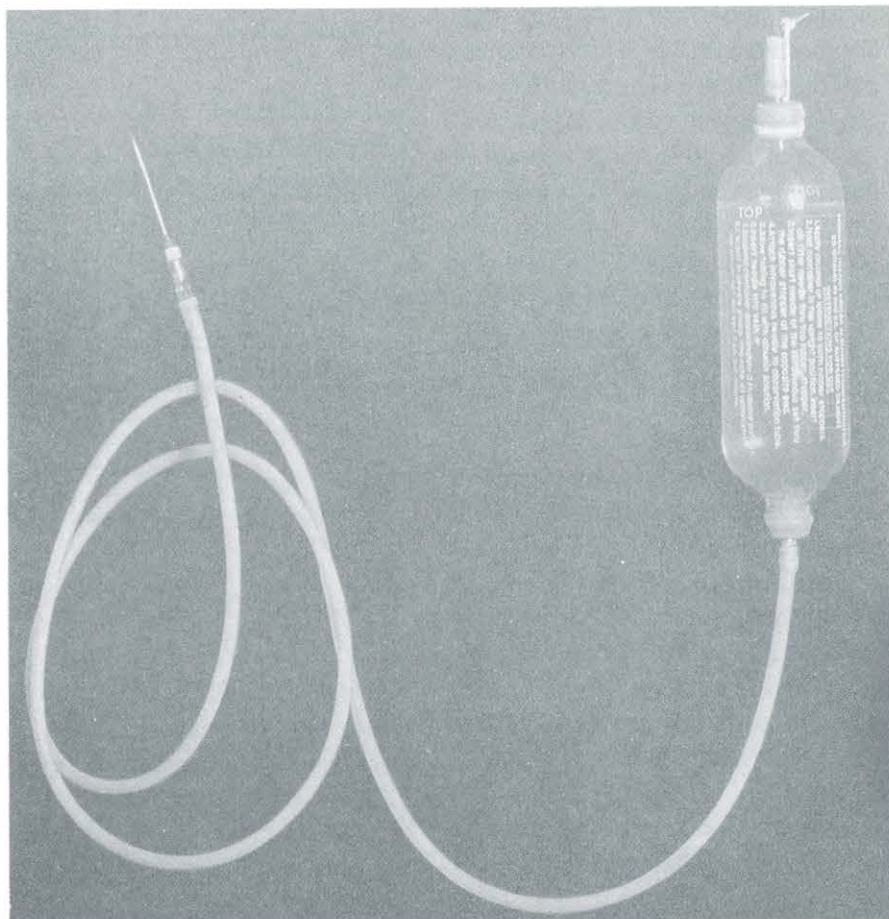
Dr. Allen is a resident in occupational medicine at the Uniformed Services University of the Health Sciences, Bethesda, MD. LCDR Blumling is an emergency nurse and is completing an MS as a family nurse practitioner.

Shock Killers

One of the lingering images of the World War II battlefield is the corpsman or medic crouched beside his wounded patient while his upstretched hand grips a glass bottle. From the bottle flowed a liquid that brought many a soldier or marine back from the threshold of death. During the early days of the war that fluid was plasma. Later it was serum albumin.

In the 1930's researchers perfected the centrifuge technique to separate blood into its components and discov-

The human serum albumin package assembled and ready for administration. Note the air filter in place at the top of the bottle and intravenous set at the bottom.



Photos from BUMED Archives

Photo by the Editor



Dr. Gibson

ered that plasma, blood's liquid component minus the red cells, could restore blood volume and counteract shock. They found that freeze-dried plasma could be stored for up to 3 years, then reconstituted with sterile water, and infused into a shock victim with very positive results.

As the United States entered World War II, plasma became the treatment of choice on the battlefield even though it had its limitations. A corpsman loaded down with all his gear could carry just so many of the fragile bottles into combat. Something else was needed and, even before Pearl Harbor, Dr. Edwin Cohn, a gifted Harvard biochemist, began a program to develop a more effective blood substitute.

In the summer of 1940, Dr. Sam T. Gibson began an internship at the prestigious Peter Bent Brigham Hospital in Boston. As the nation readied itself for war, he obtained a commission as a lieutenant (jg) in the Navy Medical Corps. He would spend the war years working with Dr. Cohn on serum albumin, first as a researcher in its development, later in ensuring its purity.

I went on active duty in October of '41. Dr. Edwin Cohn had been working on his plasma fractionation program and wanted to test it on patients. I think he asked the Navy for two jaygees [lieutenant junior grade] to be assigned to his lab at Harvard. They picked Dr. Lorande Woodruff



The ubiquitous plasma bottle at Iwo Jima in 1945 . . .

and me. Dr. Woodruff, who also became my roommate, was a surgical intern from Yale.

Dr. Cohn's program was premised on his idea that albumin would be more desirable than plasma. Albumin was responsible for the osmotic effect of plasma and was the protein that drew most of the fluid from surrounding tissues into the bloodstream when it was administered for shock.

When an individual lost a large volume of blood and went into shock,

the blood vessels collapsed. The infusion of plasma to increase blood volume counteracted this. Albumin did the same thing because the osmotic effect drew fluid from the surrounding tissues and kept the blood vessels open.

To process a unit of albumin, Dr. Cohn took a batch of plasma and added 5 percent ethanol. That precipitated Fraction I. He then adjusted the chemical milieu by adding more alcohol and got Fractions II, III, IV,

and V. Albumin was the fifth fraction.

He prepared the albumin in a 25 percent solution so that 100 ml of 25 percent albumin—one unit—produced the same effect as a 500 ml bottle of plasma. A corpsman then could carry a lot more albumin and get the same effect as a larger volume of plasma, in fact, five times more. The albumin was also in solution whereas the plasma was a powder and required a bottle of sterile water to reconstitute it. Therefore, a bottle of albumin occupied less space than plasma.

Albumin was really called "normal serum albumin (human)" because they were also working on "normal serum albumin (bovine)." The aim of the latter was to have the bovine source and eliminate the need for human donors.

As I said, Dr. Woodruff and I started in October. We contacted the emergency rooms at Boston City Hospital, Massachusetts General, Beth Israel, and Peter Bent Brigham. We got an apartment and left our phone numbers with the emergency rooms so we would be called whenever they had a patient in shock. When they called us, we took some albumin to the hospital and, after administering it, we'd measure blood pressure and hemoglobin response.

The night of December 6, 1941, Dr. Woodruff and I had gone to a party and got terrific hangovers. The next morning we went to Dr. Cohn's house for Sunday brunch, the last thing in the world we wanted to do.



. . . serum albumin in North Korea in 1951 . . .

. . . and whole blood, also in Korea, 1951.

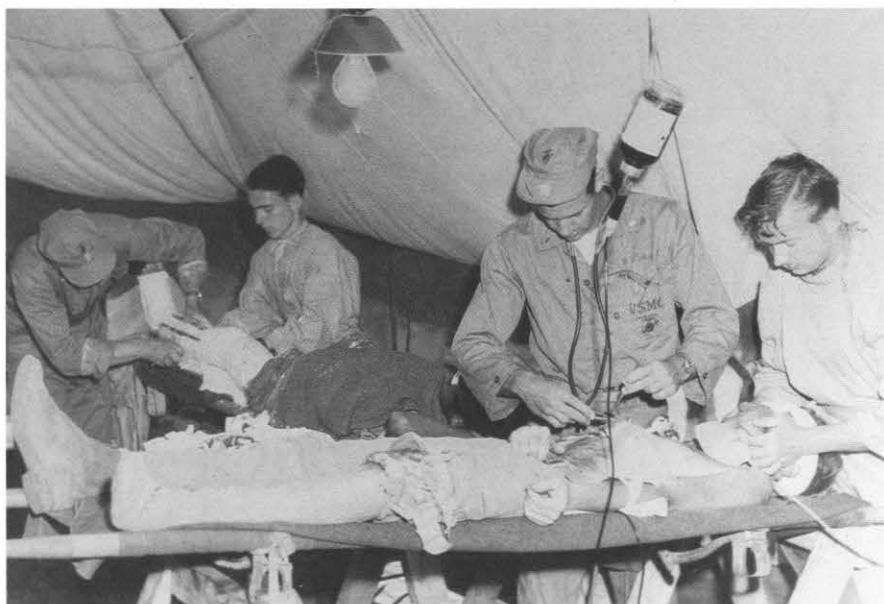
For an hour, I sipped a small glass of vermouth. Neither one of us ate very much that day.

I then took Lorrie back to the apartment so he could go to bed. After I had left him, I turned on the radio in the car and that was my introduction to Pearl Harbor. This was about 3 or 4 o'clock in the afternoon. I stopped at the corner drugstore, called Lorrie and said, "Wake up. We're at war!" So he did, and I went out on a previously planned date.

Right after Pearl Harbor, the professor of surgery at the University of Pennsylvania, Dr. Isidor Ravdin, took a bag full of albumin units and flew to Hawaii to treat the survivors of the attack. When he came back he gave a very glowing report of albumin's benefits to the burn victims. It was on the basis of this report and on the basis of 80 cases we had tested from October to January that helped persuade the National Research Council to approve albumin in January 1942.

Then there was a question of letting contracts for commercial preparation. There were about seven companies that expressed an interest in it and were eventually approved. They had to set up their labs under Cohn's supervision, then accumulate the plasma, fractionate it, and run it through all the tests. As the commercial fractionators—Armour, Sharpe and Dohme, Hyland, Cutter, and three more companies—activated the contracts, we tested a sample from every lot. All this took time so there wasn't a lot of serum albumin all during '42, and that's why it wasn't used until '43.

During the war all the commercial fractionators had to come to Cohn's lab to be trained. Cohn kept a hand in



the testing at the chemical end for consistency and so forth.

My role in all this began as one of the original experimenters with serum albumin but then changed. I helped ensure that each lot produced came up to Dr. Cohn's standards. Dr. Lloyd Newhouser was doing the same thing at the Naval Medical School in Bethesda. In August of '43, Newhouser needed someone else and so I transferred from Boston to his lab. At Bethesda, two of us did the testing, CDR Mary Sproul and I.

The albumin was packaged in double-ended bottles with stoppers at either end. A tin can about 4 inches high and about 1 1/2 inches in diameter enclosed each bottle along with the apparatus for the albumin's administration. You opened the can with the attached metal key, removed the bottle of albumin, and then inserted the air filter needle through the top rubber stopper to provide an airway. Then you inserted the needle of the intravenous set—which included rubber tubing, a filter, and an intravenous needle—through the rubber stopper at the opposite end. Then you were ready to insert the needle into

the patient's vein and begin administering the albumin.

By late winter and early spring of 1945, whole blood began appearing at the front, in time for the Iwo Jima campaign. Donated just hours before, it was packed in ice and shipped by air from San Francisco to Hawaii. After the ice was replenished, Navy transport planes rushed cases of the blood to the battlefield. As corpsmen and doctors administered the precious fluid, they found patient response to whole blood even more dramatic than with plasma or albumin, neither of which contained oxygen-carrying red cells. At Iwo Jima, corpsman Stanley Dabrowski noted the difference. "You would get color, pink lips again rather than purple."

Although whole blood augmented plasma and albumin for the war's last campaigns, it never wholly replaced the bottles of those miracle fluids better suited for front-line conditions.—JKH

This article is based on material from the BUMED Oral History Project.

Women's Health in the Operational Forces:

Problems With Oral Contraceptives

CDR Michael John Hughey, MC, USN

Many women in the operational forces utilize oral contraceptive pills (OCP). While most (80 percent) tolerate this medication without any side effects, some will not. Most of these problems can be easily resolved, enabling women in operational settings to continue their mission, without the distraction of gynecologic symptoms.

No period or very light period

The heaviness of a menses depends on the thickness of the lining of the uterus prior to the onset of menses...the thicker the lining, the heavier the flow. In women using currently-available low-dose OCPs (Ortho Novum, Lo/Ovra, Ovcon, etc.), there is a tendency for the uterine lining to become very thin over the course of many months.

...you can simply
change to a BCP from a
different manufacturer,
with different hormones
in it.

Clinically, this is reflected as lighter and lighter periods which may even stop completely.

This is not a dangerous condition and will resolve if the OCPs are stopped. Stopping them is not necessary, however, because there are other safe alternatives. If the periods are simply very light (1-2 days), you

can ignore the problem as it poses no threat.

If periods have totally stopped, add extra estrogen during one month's cycle to build up the uterine lining (Premarin 0.625 mg, with each OCP). Backup contraception is wise while taking Premarin since the contraceptive effects are unpredictable.

Or, you can simply change to a birth control pill (BCP) from a different manufacturer, with different hormones in it. Often, such a simple switch will solve the problem within 1 or 2 months.

Rule out unsuspected pregnancy as a possible cause for light or absent periods before treating the patient.

Skipped some pills

If she just skipped one pill, she should take it as soon as she remembers, then continue the rest of the pills at the normal time.

If she didn't remember until the next day, take both the current day's pill and yesterday's pill together. Then continue with the rest of the pills in the usual way.

If she's forgotten two pills or more, stop the OCPs, wait a few days for a "withdrawal" menstrual flow, and then restart a fresh package of OCPs 5 days after the onset of flow. Use backup contraception during this time and for the first month after restarting the OCPs.

Painful menses

Generally, painful menstrual cramps (dysmenorrhea) improve in women who take OCPs. If your patient complains of worsening cramps

while on OCPs, it usually means she has developed a gynecologic problem which is causing her dysmenorrhea.

Generally, painful
menstrual cramps
(dysmenorrhea) im-
prove in women who
take OCPs.

A sensitive pregnancy test and careful exam should be performed, looking for such clinical problems as uterine fibroids, pregnancy with a threatened abortion, ovarian cyst, PID and endometriosis.

If the patient has one mildly crampy period, she can be safely observed over the next month or two to see if this is the trend. Steadily worsening cramps in a woman using OCPs is worrisome and should be evaluated by a gynecologist when convenient (weeks to a few months).

In the meantime, consider placing the patient on continuous OCP therapy to entirely suppress menstruation while awaiting gynecologic consultation. The patient finishes her OCP pack and immediately begins the next pack, without waiting for menses. This is a safe method of temporarily stopping menses.

After several months, she will probably experience some spotting. This can either be watched or treated with Premarin 0.625 mg daily during the spotting.

Menstrual flow at the wrong time

If a full menstrual flow occurs while the woman is taking her pills, this usually means she has ovulated despite the OCPs. This doesn't mean she will become pregnant, since the OCP has a number of ways of preventing pregnancy in addition to inhibiting ovulation, but it may increase the statistical chance.

If she continues to take the same OCP according to her usual routine, the OCP may, over the next month or two, achieve reasonable control over the menstrual cycle. Backup methods of contraception should be employed during this time.

Alternatively, many gynecologists will stop the OCPs for 1-2 months to allow the woman's normal cycle to re-assert itself, and then resume OCPs (different manufacturer, monophasic rather than multi-phasic) in step with the woman's own cycle. This means starting the OCP the 5th day after the beginning of flow, or alternatively, the first Sunday after the onset of the flow.

Pregnancy may also cause bleeding during the pill cycle. Other causes for episodic abnormal bleeding include uterine fibroid tumors, uterine polyps, trauma and malignancy. A physical exam will reveal some of these but others will require more sophisticated gynecologic evaluation. Remember, uterine malignancy under age 35 is very rare and vaginal malignancy is extraordinarily rare. Cervical malignancy in the presence of a normal Pap smear is also very uncommon.

If abnormal bleeding persists, gynecologic consultation will be necessary, but this can be safely accomplished within weeks to months so long as:

- patient is not continuously bleeding
- examination is normal
- Pap smear is taken within 1 year
- she is less than 35 years old

Some Commonly-used Oral Contraceptive Pills, their Content and Manufacturer

<u>Pill</u>	<u>Manufacturer</u>	<u>Content</u>
Brevicon	Syntex	EES, NET
Demulen 1/35, 1/50	Searle	EES, ETD
Desogen	Organon	EES, DSG
Levlen	Berlex	EES, LNG
Loestrin 1.5/30, 1/20	Parke-Davis	EES, NEA
Lo/Ovral	Wyeth-Ayerst	EES, NGS
Micronor	Ortho	NET
Modicon	Ortho	EES, NET
Nordette	Wyeth-Ayerst	EES, LNG
Norinyl 1+35	Syntex	EES, NET
Norinyl 1+50	Syntex	MES, NET
Nor-Q D	Syntex	NET
Ortho-Cept	Ortho	EES, DSG
Ortho-Cyclen	Ortho	EES, NGM
Ortho-Novum 1/35, 777, 10/11	Ortho	EES, NET
Ortho-Novum 1/50	Ortho	EES, MES
Ortho Tri-Cyclen	Ortho	EES, NGM
Ovcon 35, 50	Meade Johnson	EES, NET
Ovral	Wyeth-Ayerst	EES, NGS
Tri-Levelen	Berlex	EES, LNG
Tri-Norinyl	Syntex	EES, NET
Triphasil	Wyeth-Ayerst	EES, LNG

ETD=Ethynodiol diacetate
DSG=Desogestrel
MES=Mestranol
NET=Norethindrone
NGM=Norgestimate

EES=Ethinyl estradiol
LNG=Levo Norgestrel
NEA=Norethindrone Acetate
NGS=Norgestrel

Headaches, depression, lowered sex-drive

Most of these symptoms are minor and disappear after the first month. If they persist for more than 1 month, you may either stop the OCP to see if the symptoms disappear, or you may switch to a different OCP (different manufacturer). Most patients will find a pill they can tolerate, although there is an occasional patient who will experience one of these side effects no matter what pill they take. Such patients should not continue OCPs.

Severe nausea, severe depression, severe headaches or any other severe side effect of the OCP should be treated by immediate discontinuation of the OCP.

Nausea

Nausea occurring after the first month or severe nausea at any time should make you suspicious of pregnancy and this is usually ruled out by a negative pregnancy test or convincing patient history.

Weight gain

Older, higher dose OCPs were associated with significant weight gain, but the low dose OCPs (1/35 or Lo/Ovral dosage or less) rarely cause significant weight gain. There is a tendency for everyone to gain weight over time, and OCP users are not immune to that phenomenon.

Breast pain

Breast pain is common during the first month of OCPs and uncommon thereafter. Breast pain is most often associated with fibrocystic breasts, getting much worse just before menses and much better after the onset of flow. OCPs are a reasonably effective treatment for fibrocystic breasts so subsequent development of significant breast pain should be viewed with suspicion.

A careful breast exam should be done to rule out newly-developed breast disease.

A careful breast exam should be done to rule out newly-developed breast disease. A recent onset of significant breast tenderness should raise your suspicions about a possible unsuspected pregnancy.

Thinks she may be pregnant

BCPs are the most effective reversible method of contraception and failures are uncommon. Factors which increase the likelihood of failure would include skipping BCPs or taking an interfering drug (such as a broad spectrum antibiotic) although the latter is controversial. Pregnancies may rarely occur in women taking the BCP correctly.

Any time any woman taking BCPs thinks she might be pregnant, get a sensitive pregnancy test. Usually, she'll be wrong and not preg-

nant, but occasionally, she'll be right and in such cases the BCP should be stopped right away.

Any time any woman taking BCPs thinks she might be pregnant, get a sensitive pregnancy test.

Spotting between periods

This symptom is common during the first month of BCPs. This is particularly true of the multi-phasic BCPs (such as Ortho Novum 777, Tri-Noriny, Triphasil, etc.). It is caused by either instability of the lining of the uterus or extreme thinness of the lining resulting from the low-dose BCPs.

This is not a dangerous condition, but may be a nuisance to the patient. In the presence of a normal Pap smear, this symptom can be safely ignored for 2 months and more likely than not, it will go away.

If spotting persists, changing to fixed-dose, mono-phasic BCP (such as Ortho Novum 1/35 or Lo/Ovral) will usually solve the problem, particularly if you switch to a different manufacturer.

Spotting between periods is not a dangerous condition, but may be a nuisance to the patient.

Occasionally, women spot even following this change and these women should stop the BCP briefly to make sure this symptom goes away. So long as the spotting disappears with discontinuation of the BCP, you can safely conclude that the spotting was due to the BCP and you may resume the BCP if you like. The

spotting may return, but poses no threat.

Other benign conditions can cause spotting, such as polyps, cervical irritation, and uterine fibroid tumors, but none of these pose an immediate threat and can reasonably be ignored for months if necessary until definitive gynecologic consultation can be obtained.

If spotting persists, changing to fixed-dose, mono-phasic BCP will usually solve the problem, particularly if you switch to a different manufacturer.

Uterine malignancy in a woman under 35 is extremely rare, particularly if that woman has been on BCPs. Spotting caused by uterine malignancy won't go away if OCPs are discontinued. Cervical malignancy can be reasonably excluded by a recent (within 1 year) normal Pap smear and the absence of a visible lesion on the cervix. Vaginal cancer (extremely rare) is ruled out by a normal vaginal exam.

As in most areas of medicine, there may be more than one way to deal with any particular gynecologic problem. Although one basic approach was given here, there may be other approaches which will give very good or superior results. □

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Naval Medical Research and Development Command Highlights

●Immune-Based Therapy for Universal Unmatched Organ Transplantation

Organ transplant therapy is the only treatment option for disease, trauma, or burn-induced failure of organs such as heart, lung, liver, kidney, bone marrow, or skin; but its use is currently limited by a lack of sufficient numbers of donor organs and by the immune rejection of the organ that typically follows transplantation due to our incomplete understanding of immune system function. Researchers from the Immune Cell Biology Program at the Naval Medical Research Institute, Bethesda, MD, are developing an immune-based therapy that disables only the immune response against an unmatched donor organ, without compromising other immune functions. This is accomplished by blocking specific signals needed by the rejecting T lymphocytes. The T lymphocyte, also called the T cell, is the white blood cell primarily responsible for directing immune responses. When an organ is recognized by a T cell as foreign, and therefore to be destroyed, the T cell becomes activated. Alternatively, if a T cell encounters an organ known to be self, it does not become activated, and no immune response ensues. Therefore, two aspects of T cell function are important. The first is the mechanism used by T cells to recognize targets, and the second is how T cells distinguish between targets. This immune-based therapy, called anergy therapy, focuses on control of the second function. It precisely targets the rejection response against the donor organ without causing global immunosuppression (and resulting complications) caused by current antirejection treatment. This work is the subject of over 20 Navy patent applications and a Cooperative Research and Development Agreement with a commercial civilian research partner. The successful outcome of this research should afford effective means to activate T cells when desired (to improve vaccine efficacy or to augment immune responses against pathogens), or to prevent T cell activation when immune responses against a specific organ are not desired (to prevent the rejection of the tissue or organ grafts necessary to treat burns or traumatic limb/organ loss).

●Advanced Technology to Evaluate Carbohydrate Loading in Operational Forces

Scientists at the Naval Health Research Center (NHRC), San Diego, CA, are conducting research to test the effectiveness of carbohydrate (CHO) loading in operational forces. For more than two decades, athletes such as marathon runners have used CHO loading, a method of artificially increasing muscle glycogen (a major source of energy in muscles) through exercise and dietary manipulation, to enhance their endurance performance. Studies have demonstrated a strong, positive correlation between pre-exercise muscle glycogen concentrations and exercise duration. Little information exists on the fate of elevated glycogen stores

acquired by CHO loading if exercise is not performed. NHRC's research has demonstrated that supercompensated muscle glycogen can be maintained for at least 3 days in a resting, trained individual. Prior to this study, CHO loading could not be recommended for operational forces because of the possibility that if a military mission were delayed, the elevated glycogen stores might return to normal. NHRC will continue CHO loading research in collaboration with Yale University School of Medicine. Yale is a pioneer in using magnetic resonance spectroscopy (MRS) to determine muscle and liver glycogen concentrations. MRS, a noninvasive offshoot of nuclear magnetic resonance technology, allows for multiple, sequential measures without any of the discomfort or postoperative problems individuals occasionally experience after a muscle biopsy.

●Vestibular MFL Used to Test Low-Frequency Sound Waves on Divers

Researchers at the Naval Aerospace Medical Research Laboratory (NAMRL), Pensacola, FL, are taking research to the field in a unique, cost-effective approach using one of their mobile field laboratories (MFL). The Vestibular MFL is designed to go out into the field and collect data related to the human vestibular system, to include balance tests, the vestibular ocular reflex, brain mapping, and visual evoked responses. For example, the Vestibular MFL was deployed to the Navy Experimental Diving Unit in Panama City, FL, to aid in the testing of the effects of low-frequency sound waves on divers. Combining the expertise of laboratory scientists and staff with all of the MFL's intricate equipment, researchers were able to pinpoint areas of the vestibular system that might be affected by exposure to low-frequency sound waves. Without the Vestibular MFL, much of this research would have been too costly or even impossible to accomplish. A followup will be conducted in open water, with the MFL parked on the beachfront. In addition to data collection, the assets of the Vestibular MFL can be used to help diagnose and treat a variety of neurological disorders. Parked next to a military medical treatment facility, the MFL could give the facility direct access to a full neurophysiological diagnostic center at a substantial savings. The Vestibular MFL maintains the capabilities of a full neurophysiological test laboratory. In order to assure that all systems on the Vestibular MFL are consistently in top condition, and that tests are performed accurately, NAMRL augments the MFL with its staff of neurologists, psychologists, optometrists, physiologists, and specialized technicians. This interaction ensures that top quality science and training occur in the field.

For more information on these and other research efforts contact Doris M. Ryan, Deputy Director, External Relations, at DSN 295-0815, Commercial 301-295-0815, FAX 301-295-4033, or E-mail ryan@mailgw.nmrhc.nmcc.navy.mil.

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